IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Applicants: M. Angelopoulos et al.

Date: December 1, 2000

Group Art Unit:

Serial No.:

Examiner:

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Docket No: YOR919960050US3

For: POLYCRYSTALLINE CONDUCTING POLYMERS AND PRECURSORS THEREOF HAVING ADJUSTABLE MORPHOLOGY AND PROPERTIES

Assistant Commissioner for Patents
Washington, D. C. 20231

PRELIMINARY AMENDMENT

At page 1, line 5, in the blank space add --08/,620,619 filed on March 22, 1996--.

At page 1, line 7, in the blank space add --08/,621,631 filed on March 22, 1996--.

IN THE CLAIMS

In claim 3, delete "plasticized"; replace therefore --plasticizer--.

In claim 3 delete "selected from the group consisting of plasticizers and diluents"; replace therefore --a plasticized--.

In claim 1, line 4, before "polymers" add --wherein said--.

In claim 10, line 1, delete "plasticizer"; replace therefor --additive--.

21. (Amended) A structure formed by a process comprising:

providing a polycrystalline material comprising crystallites of polymers with interstitial regions therebetween;

polymers selected from the group consisting of a precursor to an electrically conductive polymer and an electrically conductive polymer;

said interstitial regions between said crystallites comprising amorphous material comprising an additive;

said additive provides mobility to said polymer to allow said polymer to allow said polymer to associate with one another to achieve said crystallites; and

removing said [A structure according to claim 1, wherein the] additive [is removed].

In claim 23, delete "same"; replace therefore --crystalline--.

24. (Added) A method according to claim 1, wherein said additive has a different material composition from said solvent.

REMARKS

Reconsideration is respectfully requested in view of any changes to the claims and the remarks herein. Please contact the undersigned to conduct a telephone interview in accordance with MPEP 713.01 to resolve any remaining requirements and/or issues prior to sending another Office Action. Relevant portions of MPEP 713.01 are included on the signature page of this amendment.

The claims herein were finally rejected in the patent application herein refers to patent application final rejection (PAFR).

Claims 1-23 have been rejected in PAFR under 35 USC 103(a) as being unpatentable over WO 92/22911 in view of either the Handbook of Common Polymers, Roff, W.J., et al. editors, 1971, Butterworth & Co., pp. 515-517 (hereinafter "the Handbook") or Kirk-Othmer, Encyclopedia of Chemical Technology, 3rd. ed., 1982, John Wiley & Sons, pp. 111-115.

The Examiner states the "WO 92/22911 teaches electroconductive structures comprising *inter alia,* electroconductive polymers such as polyaniline and additives such as plasticizers (p. 16, line 4 through p. 23, line 12; and p. 36, line 21 through p. 37, line 16). Different articles are taught at p. 11, line 17 through p. 12, line 20." There is no teaching, suggestion, motivation for or incentive for applicants' claimed invention therein. There is no reference to a polycrystalline material having interstitial regions containing amorphous material as claimed by applicants.

The Examiner states that "The Handbook teaches plasticizers such as glycerol triacetate (a.k.a. "triacetin") and epoxidized soybean oil at p. 516." There is no teaching, suggestion, motivation for or incentive for applicants' claimed invention therein. There is no reference to a polycrystalline material having interstitial regions containing amorphous material as claimed by applicants.

The Examiner states that " The Encyclopedia teaches plasticizers such as epoxidized soybean oil and glycol derivatives at p. 114." There is no teaching, suggestion, motivation for or incentive for applicants' claimed invention therein. There is no reference to a polycrystalline material having interstitial regions containing amorphous material as claimed by applicants.

The Examiner further states that "WO 92/22911 may not specifically teach the particular plasticizers presently claimed as additives. Nevertheless, either the Handbook or the Encyclopedia documents the fact that glycerol triacetate, epoxidized soybean oil, glycol derivatives and other compounds are well-known plasticizers for polymers. The person skilled in the art is deemed to have been aware of those well-known material and their uses." That a person of skill in the art may in general know of plasticizers and their uses does not mean that a person of skill in the art are taught to, suggested to, motivated to or provide incentive for making a polycrystalline material having interstitial regions comprising amorphous material as claimed by applicants. The fact that the Examiner states that "WO 92/22911 may not specifically teach the specific plasticizers presently claimed" is clear evidence that WO 92/22911 provides no teaching, suggestion, motivation for or incentive for applicants' claimed invention.

The Examiner further states that "The references may or may not specifically teach the particular combination presently claimed. Nevertheless, the teachings of the references would include that combination among a limited number of possibilities in the section cited above. One skilled in the art therefore would have had a reasonable expectation of success with respect to the invention as presently claimed." The Examiner has acknowledged that WO 92/22911 provides no teaching, suggestion, motivation for or incentive for applicants' claimed invention by saying that WO 92/22911 "may or may not teach the particular combination presently claimed." Even if it is true as the Examiner says "that the teachings of the references would include that combination among a limited number of possibilities" the reference provides no teaching, suggestion, motivation for or incentive for a polycrystalline material with interstitial regions containing an amorphous material as claimed by applicants. Thus, a person of skill in the art would not have a reasonable expectation of success. The Examiner refers to 17 pages from WO 92/22911; one page from the Handbook and one page from the Encyclopedia. This is not a limited number of possibilities. How would a person of skill in the art know which combinations to choose?

The Examiner further states that "WO 92/22911 may not specifically teach the polycrystalline, amorphous interstitial regions, isotropic, crystallinity, physical properties, crystallite sizes, or structures present claimed." The Examiner here is acknowledging the reference provides no teaching for applicants' claimed invention. The Examiner further states, "Nevertheless, the reference is deemed to teach or suggest the claimed composition." This is conjecture on the Examiner's part. The Examiner further states "applicant or applicants need to show that his, her or their invention is actually different from and unexpectedly better than the prior art." The Examiner has the burden of showing that the references provide a teaching, suggestion, motivation or incentive for a polycrystalline material having interstitial regions containing amorphous material. The Examiner has not done so. Applicants do not have to show that their invention is unexpectedly better than the teaching of references that provide no teaching, suggestion, motivation or incentive for their claimed invention. Notwithstanding, applicants have shown that their invention is unexpectedly better. Applicants have shown that they have unexpectedly formed a polycrystalline material.

The Examiner further states "the references may not specifically teach the particular ranges presently claimed. However, no criticality has been shown for the presently claimed ranges over the closest prior art, and optimization of results would have been obvious to one skilled in the art. Overlapping ranges also may establish *prima facie* obviousness." The Examiner has not shown *prima facie* obviousness since the Examiner has not shown where there is a teaching, suggestion, motivation for or incentive for a polycrystalline material having amorphous interstitial regions. Criticality does not have to be shown over art which provides no teaching of applicants invention. The Examiner has pointed to no overlapping ranges. Applicants have shown criticality - a polycrystalline material with amorphous interstitial regions.

The Examiner further states that "the level of ordinary skill in the relevant art is resolved with the finding that, based on the teachings of WO 92/22911 in view of either the Handbook or Encyclopedia as a whole, it would have been obvious to one of such skill for a structure to fall within the limitations presently claimed because WO 92/22911 teaches structures comprising electroconductive polymers such as polyaniline and additives such as plasticizers, while the Handbook and Encyclopedia both document the fact that certain plasticizers are well-known in the art." The Examiner has not shown where in the teaching of the cited references there is a teaching, suggestion, motivation for or incentive for a polycrystalline material having interstitial regions containing amorphous material.

The Examiner's reasons for rejection based on WO 92/22911, The Handbook and the Encyclopedia are based on hindsight reconstruction which is impermissible to support a rejection under 35 U.S.C. 103(a). Applicant's invention is directed to polycrystalline material with amorphous interstitial regions. The Examiner must show what in the teaching of the cited references would lead a person of skill n the art to this invention. The Examiner has not done this. The Examiner has not made a *prima facia* case of obviousness. How could a person of skill in the art be directed to an invention having crystalline regions when the references have no teaching on crystalline regions? The Examiner has failed to meet the burden for obviousness under 35 U.S.C. 103.

In view of the remarks herein withdrawal of the rejection of claim 1-23 under 35 USC 103(a) in view of WO 92/22911, the Handbook and the Encyclopedia is respectfully requested.

Claims 1-3, 5-9, 11-17 and 19-23 have been rejected under 35 USC 102(b) and 35 USC 103(a) in view of U.S. Patent 5,484,884 to MacDiarmid et al. MacDiarmid is directed to extraction of emeraldine bare with THF followed by NMP. (See Col. 2, lines 40-49) which is not the inclusion of an additive which "provides mobility to said polymer

to allow said polymer to associate with one another to achieve said crystalites" as claimed by applicants. Extraction with THF and NMP as taught be MacDiarmid provides no teaching, suggestion, motivation for or incentive for applicants claimed invention. Why would a person of skill in the art know from MacDiarmid that adding an additive will result in crystalites when an extraction process is a process of removal of something? See Attachment A for a definition of extraction from Howley's Condensed Chemical Dictionary (1987). The Examiner does not answer this question. In view thereof withdrawal of this rejection is respectfully requested.

Claims 1, 3, 5-7, 9, 12-17 and 19-23 have been rejected under 35 USC 102(b) and 103(a) over Epstein et al. (4,913,867). Epstein is directed to stretch orientation which results in an increase in electrical conductivity in the stretch direction as compared to the direction perpendicular to the stretch direction. This results from the stretching pulling the polymer chains in the stretch direction which elongates the polymer in the stretch direction resulting in an increase in order in that direction which results in the increase in electrical conductivity in the stretch direction. Applicants acknowledge that stretch orientation was known prior to applicants invention. Epstein does not teach use of an additive as taught by applicants. The Examiner refers to Epstein Col. 2, lines 60-65, where Epstein refers to NMP as a plasticizer. The NMP is being used as a solvent as is evident from Epstein Col. 3, lines 11-15. NMP is a well know solvent for emeraldine base. Epstein's invention is heating and stretching at the same time to enhance the effect of stretching the film to form a crystalline polynailine film. Epstein does not teach use of an additive added to a solvent used to form a polycrystalline film as taught by applicants. On page 17 of applicant's specification, they teach Polyaniline Base in NMP and Polyaniline Base in NMP/Plasticizer. The NMP/Plasticizer combination has the effect claimed by applicants while the NMP alone does not have the effect claimed by applicants. There is no teaching or suggestion in Epstein that there is an increase in the crystallinity of the polyaniline prior to heating and stretching. Epstein teaches that there is no such effect since Epstein teaches at the top of Col. 3 that slow heating results in less crystallinity and rapid heating results

in greater crystallinity. Moreover, applicants claim a polycrystalline structure, that is one that has a plurality or crystallites with amorphous regions between the crystallites. There is no teaching, suggestion, motivation for or incentive for such a structure in Epstein. In view thereof withdrawal of this rejection is respectfully requested.

The description of Fig. 5, at the bottom of page 8, states that Fig 5(a) shows an amorphous film (essentially no crystallinity for a film processed from NMP) (See the last paragraph at page 12) and Fig. 5(c) shows a highly crystalline film for a film process in NMP with 10% poly-co-dimethyl-propylamine siloxane. (See the last paragraph on page 14). The references cited by the examiner refer to NMP as a plasticizer. This is more typically called a solvent. But they do not teach NMP in combination with another additive, such as what applicants refer to as a plasticizer. Thus, what the cited references refer to as a plasticizer does not work to achieve the unexpected result discovered by applicant which for the data shown in Fig. 5 results from a combination of different constituents (that is a solvent and a plasticizer) for which there is no teaching or suggestion in the cited references. Claim 18 specifically includes the Fig. 5 example.

In view of the changes to the claims and the remarks herein, the Examiner is respectfully requested to reconsider the above-identified application. If the Examiner wishes to discuss the application further, or if additional information would be required, the undersigned will cooperate fully to assist in the prosecution of this application.

In response to applicants' arguments in response to the PAFR, claim 24 (which was added in response to the PAFR) was allowed. The independent claim allowed in the parent is:

24. A structure comprising:

a polycrystalline material comprising crystallites of polyaniline with intersticial regions therebetween;

said polyaniline is selected from the group consisting of a precursors to an electrically conductive polyaniline and an electrically conductive polyaniline;

said intersticial regions comprise an amorphous material selected from the group consisting of polyaniline;

said amorphous material includes an additive in an amount from about 0.001% to about 90% by weight;

said additive is poly-co-dimethylaminopropyl siloxane.

The examiner allowed this claim stating "the instant specification discloses superior/unexpected results for compositions containing polyaniline and NMP 10% poly-co-dimethyl-propylamine siloxane". The references cited by the Examiner do not teach or suggest a method comprising a solvent and an additive. For the sake of argument herein, at best, following the Examiner's argument, a person of skill in the art would be motivated by the references to use 100% additive which applicants' examples have shown do not achieve the desired result, crystallinity. Applicants' claims do not read on using 100% additive and thus do not read on what a person of skill in the art would be motivated to do by following the Examiner's argument. Applicants' argument in the paragraph is intended to rebut the Examiner's rational. As stated herein above, the cited references have no teaching or suggestion of increasing crystallinity or using an additive. Thus a person of skill in the art would not be motivated at all by these

references to practice applicants' claimed invention. Based on the references a person of skill in the art has no expectation of increasing crystallinity by using any additive.

Please charge any fee necessary to enter this paper and any previous paper to deposit account 09-0468.

If the above-identified Examiner's Action is a final Action, and if the above-identified application will be abandoned without further action by applicants, applicants file a Notice of Appeal to the Board of Appeals and Interferences appealing the final rejection of the claims in the above-identified Examiner's Action. Please charge deposit account 09-0468 any fee necessary to enter such Notice of Appeal.

In the event that this amendment does not result in allowance of all such claims, the undersigned attorney respectfully requests a telephone interview at the Examiner's earliest convenience.

MPEP 713.01 states in part as follows:

> Where the response to a first complete action includes a request for an interview or a telephone consultation to be initiated by the examiner, ... the examiner, as soon as he or she has considered the effect of the response, should grant such request if it appears that the interview or consultation would result in expediting the case to a final action.

Respectfully submitted,

By _____

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ATTACHMENT A